

Description of the Industry Trends Program (ITP) Process

1. Background

The U.S. Nuclear Regulatory Commission (NRC) provides oversight of plant safety performance on a plant-specific basis using both inspection findings and plant-level performance indicators (PIs) as part of its Reactor Oversight Process (ROP). Individual issues that are identified as having generic safety significance are addressed using other NRC processes, including the generic communications process and the generic safety issue process. As discussed in SECY-01-0111, "Development of an Industry Trends Program for Operating Power Reactors," the NRC's Office of Nuclear Reactor Regulation (NRR) initiated the ITP to complement these processes by monitoring and assessing industry-level trends in safety performance.

The purposes of the ITP are to provide a means to confirm that the nuclear industry is maintaining the safety performance of operating reactors and, by clearly demonstrating that performance, to enhance stakeholder confidence in the efficacy of the NRC's processes. The objectives of the ITP are as follows:

- ! Collect and monitor industry-wide data that can be used to assess whether the nuclear industry is maintaining the safety performance of operating plants and to provide feedback on the ROP.
- ! Assess the safety significance and causes of any statistically significant adverse industry trends, determine if the trends represent an actual degradation in overall industry safety performance, and respond appropriately to any safety issues that may be identified.
- ! Communicate industry-level information to Congress and other stakeholders in an effective and timely manner.

A key output of the ITP is that it provides the basis for agency monitoring and reporting in the Nuclear Reactor Safety arena against the performance goal measure of "no statistically significant adverse industry trends in safety performance," as defined by the NRC's Strategic Plan. The agency reports these results annually to Congress in the Performance and Accountability Report, Fiscal Year 200X" (NUREG-1542 series). In early FY 2001, NRR assumed responsibility from the NRC's Office of Nuclear Regulatory Research (RES) for reporting on this measure as part of NRR's overall responsibilities in the Reactor Safety arena. The current bases for assessing performance against this measure are trends in the industry indicators developed by the former NRC Office of Evaluation of Operational Data (AEOD) and trends identified by the ASP Program. Notably, these indicators were among those cited as demonstrating improvements in industry safety performance that contributed to the agency's decision to revise the ROP.

In developing the ITP, the staff used the following general concepts for its approach:

- ! The indicators were developed using information available from current NRC programs. In the future, indicators will be developed in stages, and will provide information for each ROP cornerstone of safety.
- ! Industry trend information is derived from quantitative, industry-wide data.
- ! Trends are identified on the basis of long-term data, rather than short-term data. This minimizes the impact of short-term variations in data, which may be attributable to such factors as operating cycle phase, seasonal variations, and random fluctuations.
- ! Trends and contributing factors are assessed for safety significance. The results of inspections, analyses of significant events and abnormal occurrences, and other analyses may be used to facilitate an evaluation of the trends. The agency's response is commensurate with the safety significance.
- ! While additional indicators are being developed, a subset of high-level indicators may be used for the report on adverse trends to Congress in the NRC's Performance and Accountability Report. For reporting on the performance measure of "no statistically significant adverse industry trends in safety performance," indicators will be qualified for use in phases. Until they are qualified, the staff will continue to use the AEOD indicators and ASP results. Additional indicators from the ITP will be incorporated for use in accordance with a controlled process for making such changes to the NRC's Performance Plan. In addition, the staff intends to consider refinements to the performance measure as the indicators and more risk-informed methods of assessing their safety significance are developed.

2. ITP Process

A flowchart of the ITP process is shown below

Industry Trends Program

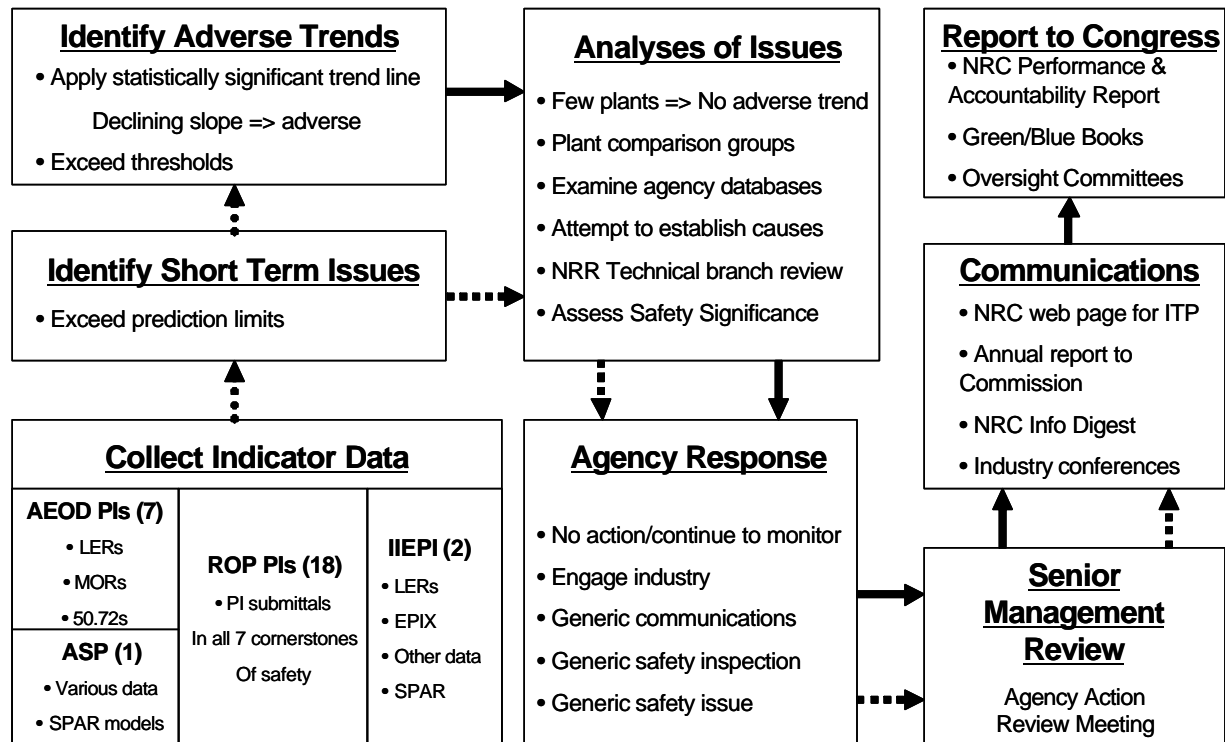


Figure 1-1 Industry Trends Program process flowchart

Collect Indicator Data

In developing the ITP, the staff used information currently available from existing NRC programs to develop an initial set of indicators for identifying adverse industry trends. The indicators consisted of the 7 indicators in the AEOD indicator program and the results of the ASP program. In addition, the staff is developing more risk-informed industry-wide indicators using data from the 18 plant-level indicators submitted by licensees for the ROP PI program. The staff also identified potential indicators for initiating events that are anticipated to be available from RES operating experience data. These indicators are being consolidated into an Industry Initiating Events Performance Indicator (IIEPI).

Identify Short-Term Issues

In addition, as discussed in SECY-01-0111, in FY 2001 NRR adopted a statistical approach using “prediction limits” to provide a consistent method to identify potential short-term emergent issues before they manifest themselves as long-term trends. The prediction limits are values established at the beginning of a FY that set an upper bound on expected performance for that year for each indicator. Actual indicator values during the year can then be monitored and compared to the prediction limits. Indicators that cross the prediction limits are investigated to determine the factors contributing to the data. These factors are assessed for their safety significance and used to determine an appropriate agency response. However, should very obvious adverse trends emerge in the short-term data, the staff does not wait until the end of the annual reporting period to initiate a review.

Identify Adverse Trends

For purposes of assessing whether there are any statistically significant adverse industry trends, only long-term data is used. The trending of long-term data minimizes reacting to potential “false positive” indications that may emerge in short-term data. “Short-term” was defined to be less than four years to ensure that sufficient data (i.e., data for at least two typical nuclear plant operating cycles) is available so that valid trends can be distinguished from operating cycle effects such as refueling outages and from random fluctuations in the data and to allow sufficient data for the use of statistical methods. The staff expects that any variations beyond these will result from plant-specific issues which can be addressed under the ROP.

The staff applies common statistical techniques to the long-term indicator data to identify trends. These techniques have been previously adapted and used extensively by the former AEOD and by RES in reactor operating experience analyses over the past several years. In general terms, a trendline is fitted to each indicator using regression techniques. Once a statistically significant fit of a trendline is made to each indicator, the slope of the trendlines is examined. Improving or flat trendlines are not considered adverse and need not be investigated further. Degrading trendlines are considered adverse.

Analyses of Issues

Once an adverse trend is identified, the staff conducts an initial analysis of information readily available in the databases used to compile the indicator data to determine whether the trend is unduly influenced by a small number of outliers and to identify any contributing factors. If the trend is the result of outliers, then it is not considered a trend requiring generic actions, and the agency will consider any appropriate plant-specific actions using the ROP. For example, the affected plants unduly influencing the adverse trend may have already exceeded plant-level thresholds under the ROP, and the NRC regional offices would conduct supplemental inspections at these plants to ensure the appropriate corrective actions have been taken. If the plants did not exceed any thresholds, while the NRC would not take regulatory actions beyond the ROP, the NRC would gather additional information on the issue within the scope of the ROP using risk-informed baseline inspections. The results of these inspections would be examined to determine if a generic issue existed requiring additional NRC review or generic inspections.

If no outliers are identified, the staff conducts a broader review to assess whether larger groups of facilities are contributing to the decline and to assess any contributing factors and causes. For example, the data review is expanded to include a review of various plant comparison groups, contributing factors such as the operational cycle stage of the facilities (shutdown, at-power, startup from refueling, etc.), and the apparent causes for the data (equipment failures, procedure problems, etc.). The staff will also conduct a more detailed review of applicable licensee event reports. Should a group of plants be identified, the staff will examine the results of previously conducted inspections at these plants, including any root causes and the extent of the conditions.

Once this information is reviewed, the staff assesses the safety significance of the underlying issues. The staff is mindful that trends in individual indicators must be considered in the larger context of their overall risk significance. For example, a hypothetical increase in automatic scrams from 0.4 to 0.7 per plant per year over several years may be a statistically significant trend in an adverse direction. However, it may not represent a significant increase in overall risk since the contribution of a small number of scrams is relatively low, and it is possible that overall risk may actually have declined if there were reductions in the frequency of more risk-significant initiating events or the reliability and availability of safety systems had improved. Depending on the issues, the staff may perform an additional evaluation using the most current risk analysis tools or an evaluation by the ASP Program.

Agency Response

Until thresholds for ITP indicators are developed to establish the significance of indicator data, should a statistically significant adverse trend in safety performance be identified or an indicator cross a prediction limit, the staff will determine the appropriate response using the NRC's established processes for addressing and communicating generic issues. These processes are described in SECY-99-143, "Revisions to Generic Communications Program."

In general, the issues will be assigned to the appropriate branch of NRR for initial review. The branch will engage NRC senior management and initiate early interaction with the nuclear power industry. Depending on the issue, the process could include requesting industry groups such as NEI or various owners groups to provide utility information. As discussed in SECY-00-0116, "Industry Initiatives in the Regulatory Process," industry initiatives, such as the formation of

specialized working groups to address technical issues, may be used in lieu of, or to complement, regulatory actions. This can benefit both the NRC and the industry by identifying mutually satisfactory resolution approaches and reducing resource burdens.

Depending on the issues, the NRC may consider generic safety inspections at plants. In addition, the issues underlying the adverse trend may also be addressed as part of the generic safety issue process by RES. After this interaction, the NRC may consider additional regulatory actions as appropriate, such as issuing generic correspondence to disseminate or gather information, or conducting special inspections for generic issues. The process also includes consideration of whether any actions proposed by the NRC to address the issues constitute a backfit.

Senior Management Review

The industry trends program, results, and agency response are reviewed annually during the Agency Action Review Meeting (AARM). In general, the AARM is intended to review the appropriateness and effectiveness of staff actions already taken, rather than to make decisions on agency actions. NRC senior managers review the industry trends information and, if appropriate, recommend any additional actions beyond those implemented by the staff.

Communications With Stakeholders

The NRC communicates overall industry performance to stakeholders by publishing the ITP indicators on the Nuclear Reactors portion of the agency's public Web site at <http://www.nrc.gov/reactors/operating/oversight/industry-trends.html>. The staff believes that communication of the industry-level indicators, when added to the information on individual plants from the ROP, enhances stakeholder confidence in the efficacy of the NRC's oversight of the nuclear industry.

The staff informs the Commission of the results of the ITP in an annual report in the same timeframe as the AARM. The indicators are also published annually in the NRC's "Information Digest 200X" (NUREG-1350 series). In addition, NRC managers have historically presented industry indicators and trends at major conferences with industry.

Reports to Congress

The NRC reports the industry indicators to Congress annually in the NRC's "Performance and Accountability Report, Fiscal Year 200X" (NUREG-1542 series), and in the NRC's "Budget Estimates and Performance Plan Fiscal Year 200X" (NUREG-1100 series). The indicators demonstrate how the agency has met the measure of "no statistically significant adverse industry trends in safety performance" for the performance goal of maintain safety. Adverse trends would be reported, but indicators that exceeded prediction limits need not be included in these reports since these are tools to monitor industry performance rather than desired thresholds of performance.

In addition, the Commission has historically used the ITP indicators when presenting the status of industry performance to the NRC's oversight committees.